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ABSTRACT

A thesis project was conducted to design, develop, implement, and evaluate a job aid used by shipping department employees in a dental laboratory. The job aid was developed in preference to training to solve the organization's performance problem. Task analysis was performed to identify the shipping clerks' duties. These tasks were stated in the form of goals. Instructional objectives were then written with entry behaviors defined. The instructional objectives were sequenced according to task relationships that eventually led to the instruction. The learning activity specification was produced depicting the proper selection, type, and size of dental product. After consideration of several types of job aids, a pocket aid or wallet card was tried. However, some clerks forgot to keep the cards in their wallets, resulting in confusion and increased training time. Therefore, in addition to the pocket cards, placards were located at the appropriate bins for various articles to be shipped. The job aid was developed and implemented smoothly, resulting in a documented performance improvement. Summative evaluation of the project shows that the job aid was not only cheaper than training ($125 versus $894), but resulted in annual savings of more than $50,000 to the organization. Appended are charts, diagrams, and checklists concerned with the project plan, task analysis, and job routine, as well as the developed job aids (pocket card and placard). (KC)

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THE SCHOOL OF MEDIA AND ARTS

of

NEW YORK INSTITUTE OF TECHNOLOGY

announces the

Final Examination

of

Timothy E. Selg

for the degree of

MASTER OF SCIENCE

A Job Aid Solution to the Need for Low Cost, Results Oriented Dental Laboratory Manufacturing Industry Training

Abstract

This Thesis/Project consists of the design, development , implementation, and evaluation of a job aid used by shipping department employees. The job aid was developed in preference to training to solve the organization's performance problem. The job aid was developed and implemented smoothly, resulting in a documented performance improvement. Summative evaluation of the project shows that the job aid was not only cheaper than training, but resulted in annual savings of over $50,000 to the organization.

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A JOB AID SOLUTION TO THE NEED FOR LOW COST, RESULTS ORIENTED DENTAL LABORATORY MANUFACTURING INDUSTRY TRAINING

a

THESIS/PROJECT

by

TIMOTHY E. SELG

submitted to the faculty of the

School of Media and Arts

of

NEW YORK INSTITUTE OF TECHNOLOGY

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

February 1988

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Abstract

This Thesis/Project consists of the analysis, design, development, implementation, and evaluation of a job aid to instruct new and existing employees in a shipping department. The setting for this training activity is J.F. Jelenko, Inc., a major dental technology company, located in Armonk, New York. This Thesis/Project will demonstrate the effective use of one job aid and how it reduced training costs without sacrificing content and employee performance.

Like most companies in the United States, J.F. Jelenko shipping clerk positions are entry level. Turnover for these positions is high. This fact makes a formal instructor-driven training seminar expensive and time consuming. This Thesis/Project examines how the job aid was successfully delivered, implemented, and evaluated.

ACKNOWLEDGEMENTS

As with many projects of this size and magnitude, the work is not of one but of many. It is here that I would like to thank those that assisted to the completion of this project. My Advisor, Dr. Angus Reynolds, whose patience and guidance was needed and required; my children, who left me alone during the critical stages of this project; and finally, to my wife, whose love and understanding was a source of strength and inspiration and whose tireless effort is deeply appreciated. To these individuals - my sincere thanks and devotion.

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CHAPTER 1

INTRODUCTION

Overview

Generally speaking, today's business environment is "bottom line" motivated where performance counts, and costs are kept low. In most cases, training is a non-revenue generating activity. Thus, most training activities deplete budgets and revenues. Therefore, it behooves the training manager to identify whether training can solve the problem and then determine what will be the most effective type of training to conduct. Will video training solve the problem? What about slides or technical training in lecture format? To cope with continual training methodologies, instructional designers, training managers,and department managers must continually alter the methods, content and presentation format to effectively train today's worker.

This Thesis/Project will show how a non-instructional training intervention, provided a successful training outcome consistent to a random transient population with a high turnover rate. This project was performed at J.F. Jelenko and Co., a manufacturer of dental alloys and equipment for the dental technology industry. Jelenko also sells investments (powdered mold material), consumable items, and other products. The investment product line is the one with which the training intervention took place.

Statement of the Problem

There was a need to quickly train newly hired employees in the shipping department. Employees have difficulty regarding products that look similar in packaging and design, however, differ in function and use. A large number of shipping errors occurred and product returns increased because the incorrect investment was shipped or the incorrect size of the investment was shipped out to the customer (table 1).

TABLE 1

Dollar Amount Sold and Returned
June 1st - June 30th 1987

Pkg. Code	Item	Units Sold	Units Returned	Annual Returns Projected
144/90's	Highspan Investment ($90)	$14,400	$630	$7,560
144/60's	Highspan Investment ($65)	$ 6,500	$130	$1,560
144/90's	Complete Investment ($87)	$14,790	$783	$9,396
144/60's	Complete Investment ($62)	$ 6,820	$186	$2,232
Projected Year End Total:				$20,748

Purpose of the Project

In the past, Jelenko's training was in the form of lecture-based seminar formats. However, in the result-orientated environment that exists today, trainers must place more training into a shorter time-frame without

increasing course length (Mager, 1970). Training departments are becoming accountable for what is being taught. Therefore, this project will attempt to show how to save training development time and money without sacrificing content as suggested by Harless (1970, 1981). It will also demonstrate how to enhance employee performance using short-term efforts. Finally, the project will demonstrate how to shorten the learning curve and still receive optimum results (Mager, 1973) and learner achievement.

Since the early 1960's general issues on adult learning have been raised and studied, however, not much has been developed concerning the adult learner in the work place regarding job aid performance or spatial discrimination. Many scholars and researchers (such as Gagne and Briggs, 1979; Kaufman, 1977; and Maslow, 1970) have provided theoretical bases or practical models for adult learning and evaluation. However, some models did not include: what was needed, how to teach it, "how do I know when I get there," approach (Zigon, 1973). Often, implementation of past approaches dealt with results only, and if the solution didn't fit the problem, we would change the problem. Due to these limitations in the business work place, a number of articles, seminars and in-house presentations were written and delivered dealing with worker performance.

For example, one experimentor has studied the adult learner in the workplace (Cornwell, 1982) and has found out that giving the learner what they need to know to perform their job increases learner response and performance. Another research finding has proved that the learner's ability to make discriminatory observations was improved with instruction (Dwyer, 1978).

Definition of Terms

In order for communication to improve between the reader and this project, some terminology must be further described and defined.

1. Dental Alloys - A combination of two or more metals to form an alloy or compound. Examples are gold/copper or gold/palladium or palladium/silver.
2. Dental Technology Industry - The industry that manufactures dentures, removable partial dentures, caps or bridges.
3. Jelenko - J.F. Jelenko and Co., 99 Business Park Drive, Armonk, New York, 10504 (914-273-8600) is a company in the dental technology industry that manufactures dental gold alloys and other related industry items.
4. Investment - The material used to enclose or surround a pattern of a dental restoration (denture, cap or bridge) for casting or molding purposes.

Limitations

1. This project will only address a single area of concern - a shipping problem for a single product. This project is designed for Jelenko's shipping clerks and can no way be advanced to address other training problems within Jelenko, without modification.
2. This project will not focus on how to avoid other product related problems that involve investments elsewhere at Jelenko. Additionally, this project may not be suitable for use in other types of organizations, circumstances, situations or events without modification.

Methods and Procedures

ANALYSIS

Method. "Customer Service" identified a higher rate of return for investment than normally occurred for other items (table 2). Statements by customers indicated the correct investment was being sent; however, not the correct size. It was suggested, by management, that shipping clerks in the shipping department be given a formal, full length product knowledge training program.

Procedure. A procedural analysis was conducted that identified the problem, described what was happening, and suggested a probable solution to address the problem.

TABLE 2

Units of Sale and Return
from June 1st - June 30th 1987

Pkg. Code	Item	Units Sold	Units Returned	% Returned
144/90's	Highspan Investment	160	7	4%
144/60's	Highspan Investment	100	2	2%
144/90's	Complete Investment	170	9	5%
144/60's	Complete Investment	110	3	3%
	TOTAL	540	21	3.5%

DESIGN

It was determined from the procedural analysis that a "full blown" training course would not solve the investment shipping problem, while at the same time offer information that does not pertain to the real problem. This approach provided information that was needed but does not eliminate information that is nice to know. A job aid was selected.

DEVELOPMENT

A job performance aid was developed to address the shipping problem. The development will address the design of the learning activity produced while also discussing the development of the learning activity. A learning activity review will be performed and materials for evaluation of the job aid produced.

IMPLEMENTATION

Materials were produced for the implementation of the training activity. Instructional delivery will be addressed and how it was conducted. This chapter will also describe the data collection process needed for the summative evaluation.

EVALUATION

Formal evaluations were conducted and discussed in detail the formative and summative evaluation process. Topics include one-on-one trials, small group trials, and pilot testing. These topics will be related to this project.

Summary

There was a need to train employees in the shipping department to reduce shipping errors due to size and packaging similarities. This project uses a non-traditional approach to training to save time and money. It will show whether a job aid can be an effective training activity, without sacrificing training quality. A list of terms were defined to enhance understanding of Jelenko and the dental technology industry.

CHAPTER 2

ANALYSIS

Introduction

Instruction is the solution to a problem. Therefore, the instructional design process begins with the identification of a problem. This process is referred to as needs assessment (Kaufman, 1979). It defines for the instructional designer "what is" and "what should be"; a gap between the way things are and the way things should be. In this chapter the designer will analyze the training need and determine if training is really needed, define the goal and expected outcome levels, as well as survey existing literature.

Definition of Training Requirement

Investment returns due to incorrect shipment had increased to an annual average of 3.5% of total shipments (refer to table 2). It appeared from all evidence that if left uncorrected, the error rate would exceed 5% of total shipments by the end of the 1987 year. Over the last three calendar years (1984 - 1986), the average error rate was 1% or less of total annual shipments (see table 3). Therefore, actual performance had decreased from desired performance by a factor of three. A Jelenko shipping clerk must select the correct item as stated on the purchase order.

TABLE 3

Annual Error Costs

Levels	Error Rate	Units	Annual Cost
Previous	1%	64	$ 5,038
Present	5%	320	$ 25,190
Acceptable	3.5%	224	$ 17,633

In this instance, it appears that the main intent is for the worker to be able to select the correct size case of investment. That is, to pick what is on the purchase order. That is what the worker is expected to be able to do. It might be asked; "What is the best way to find out if someone can do that?" One method is to give workers an order and watch them fill it. In order to do this, it is important to know that what was selected in this analysis by the worker is indeed what is expected to be selected in the work routine. In the ten test cases, two were incorrectly filled, and would have been shipped to the customer -- and ultimately returned.

A 1% error rate is acceptable as a high level of performance. Error rates greater than 3.5% are unacceptable because of the significant loss in revenue and due to the large number of units sold annually (see tables 4 & 5).

TABLE 4

Total Annual Units Sold and Gross Revenues

Pkg. Code	Item	Units	Revenues
144/90's	Highspan Investment ($90)	1920	$172,800
144/60's	Highspan Investment ($65)	1200	$ 78,000
144/90's	Complete Investment ($87)	2040	$177,480
144/60's	Complete Investment ($62)	1320	$ 81,840
	TOTAL:	6480	$510,120

TABLE 5

Shipping Costs

Average rate $12 both ways

Level	Error Rate	Units Returned	Shipping Costs
Previous	1%	64	$ 768
Present	5%	320	$ 3,840
Acceptable	3.5%	224	$ 2,688

Finally, the shipping clerks were asked to identify what they think are the best solutions to the problem. From these answers, an instructional goal was developed.

This job falls in the cognitive domain of the taxonomy of educational objectives suggested by Bloom (1956). The job can be categorized as knowledge, the lowest major category in the cognitive domain. Goad (1982) identifies four learning categories; mental skill, information, physical skill, and attitude. This job falls in the mental skill category. The learning sub-categories for mental skill are: learning and using rules, classifying - recognizing patterns, identifying needs, detecting, and making decisions. This job requires the use of: learning and using rules, detecting, and making decisions.

Definition of the Instructional Program

The instructional goal process should, whenever possible, follow the needs analysis. For the instructional design does take place in a specific context. Likewise, the instructional goals for this project were developed in this same manner and style. The goal of this training program is to reduce errors in the shipping department. The shipping clerks will achieve this by using the job aid provided. This reduction in errors can be accomplished through some form of training activity. The training activity chosen is a non-training activity -- the job performance aid.

These job aids are the instructional program. The job aids were to be handed out as pocket guides to each

shipping clerk. Once placed, it will be monitored and it's outcome will be measured.

Survey of Existing Courses and Literature

A search of existing courses, clinics and seminars was conducted. Two companies were found that provide training, video tapes, and lectures to dental manufacturers; Belle de St. Claire and Productivity Training Corporation. However, their information demonstrates how to use our product, not how to ship our product. A further search of the market indicated a big gap in what is availalbe "off the shelf" for companies like Jelenko who now must develop their own training to fulfill specific training requirements. A review of the literature does not show a broad spectrum of information and articles that address or discuss job aids. Consequentially, there is little evidence to discuss or predict the results or impact that a job aid will carry with it. A computer search was conducted and found some job performance aids. Five sources were identified containing job aid information. However, only one proved to be useful. A hand search was then conducted and found to be more fruitful, yielding a greater source of referral and research. Resources on job aids were found to be mostly in articles in two journals; Training Magazine, 1984-1986 and

Performance and Instruction Journal, 1984-1987. These are discussed below.

Duncan, C.S. (1985). Job Aids Really Can Work: A Study of the Military Application of Job Aid Technology. Performance and Instructional Journal. 24, 1-4.

The article addresses how the U.S. Army can put more training into programs of instruction, without significantly increasing the course length. It shows how the army saved time and money in training development without sacrificing potential student achievement. The article further illustrates the effective use of job aids for sustained job performance. It also illustrates how medium-to-low aptitude personnel enhanced their performance through the use of job aids.

Probst, C.O. (1985). Job Aids and Non-Aids in Everyday Life. Performance and Instructional Journal, 24, 24-25.

Using needs analysis and task analysis, performance technologists develop ways to improve human performance. The article defines job aids and what can be learned from them in everyday life. The article cites real life examples from business and industry where from a needs analysis,a job aid was developed to correct a performance problem.

Tillman, M. (1985). Job Aids in Text Design. Performance and Instruction Journal, 24, 24.

The article discusses various text layouts when constructing job aids. It also outlines four criteria used when constructing a job aid. Using Mager's Goal Analysis, the article enhances one's understanding of what an effective job aid can accomplish.

Yarusso, L. (1985). Job Aids: Conference Presentation List. Performance and Instructional Journal, 24, 26-27.

A job aid performance checklist is discussed. The article provides examples of a job aid using conference presentation checklist. It illustrates how a single checklist can become an important aid to improve performance. The article determines whether or not objectives were met and if these objectives are dependent upon the successful outcome of additional objectives.

Zemke, R. (1984). Training in the Federal Government. Training Magazine, 114-122.

Keeping track of the cost amount and types of training delivered to the U.S. Government cost over $2 billion a year. In 1984, two million government employees experienced some form of training. The article discusses training budgets in various federal agencies and who received what

type of training. The article also addresses various cost conscious alternatives to formal training, of which the job aid is one.

Zemke, R. (1985). Customer Education: The Silent Revolution. Training Magazine, 26-39.

The fastest growing type of training in the country today is aimed, not at school children, but company employees. This article utilizes a special analysis which includes data from Training Magazine's 1984 Industry Report. The article states three areas of training which have shown the greatest growth: Supervisory, Sales, and Computer. It further illustrates provocative attempts to conduct cost effective training activities.

Plan for Design and Development Effort

The remaining aspects of this project include the design of the job aid. What is the most effective job aid type, layout, wording, size, and placement of the aid: Development includes a formative evaluation process. The project will be implemented. A summative evaluation of the project will be offered to identify the effectiveness of the training activity and its outcome. Also, costs will be compared to that of a formal training activity versus a job aid.

Finally, a summary of the project and appropriate recommendations will be provided and discussed. A project plan is included in Appendix 1.

Summary

In this chapter, training was discussed, the origin of the requirement and the need for training was justified. Also explained was how shipping errors had increased and were affecting revenues. A instructional goal was chosen to address the problem. Literature reviews were conducted and course reviews surveys were taken. This information helped formulate this project.

CHAPTER 3

DESIGN

Introduction

This chapter discusses the instructional task analysis and how it is an integral aspect of the instructional design process. Instructional objectives are introduced and entry behaviors defined. Objectives are grouped and sequenced and related to the learning activity. Finally, assessments will be made based upon an evaluation of the job aid and review of existing materials.

Instructional Task Analysis

An Instructional Task Analysis (ITA) is an integral part of the instructional design process. The ITA identifies the relevant sub-tasks that are required for the learner to achieve the goal. When identifying the instructional analysis of a goal, two fundamental steps must be included. The first must classify the goal statement according to the type of learning that will occur. The second is to use the information in the procedural analysis to describe exactly what a learner will be doing when the learner performs the goal. Once the goal is determined, how do you know what skills must be learned in order to achieve the goals? These skills are the sub-tasks for this project (see Appendix 2). The tasks involved are

simple. The investments are superficially the same; in terms of size, color, general appearance of label, and they are stored in adjacent locations (see Appendix 3).

Instructional Objectives

1. Given a purchase order, be able to select the correct investment, without error, using the job aid to assist in selection.
2. Given a purchase order, be able to select the correct size of investment of either variety, without error, using the job aid to assist in selection.

Entry Behaviors Defined

The entry behaviors the learner must possess in order to perform the instructional goal are as follows:

- Read English
- Be able to identify a Purchase Order
- Be able to read from a Purchase Order
- Identify the various locations of Jelenko's products in the shipping department.

Group and Sequence Objectives

The logic used within this section is to have the shipping clerk be able to first select the correct type of investment, be it Highspan or Complete, then to have the shipping clerk select the correct size of investment. If the type is incorrectly selected initially, size is inconsequential.

Learning Activity Specification

The content of the learning objective includes product selections from the purchase order where the shipping clerk must physically pick the correct investment from the bin. If the clerk needs assistance in the proper selection according to size, count or type of investment listed on the purchase order, the job aid related to each investment bin will be used. Minimal informal instruction of the use of the job aid was given to the shipping clerks. In the future, new shipping clerks will receive training either from the shipping manager or other shipping clerks (see Appendix 4).

Assessment System Specification

Learning will be measured by having the line supervisor implement progress checks at various intervals during the day. The line manager will check for accuracy and consistency by the clerks (see Appendix 5 for the Line Supervisor Check Sheet).

Evaluation System Specification

Evaluations tend to be defined as the determination of the effectiveness of a training activity as compared to either other similar types of training activities or proposed outcomes. Two forms of evaluation can be the formative evaluation, which is conducted during the devel-

opment of the training activity. Summative evaluations measure the outcomes of training; to qualify whether changes have occurred. Formative evaluation can include one-on-one, small group, or field test evaluations. For this project, the target population is small in number -- eight, thus a sub-group, two individuals which represent 25% of the target population were selected. The summative evaluation will include the incidence of shipping errors reduced, and the comparative costs of the job aid to that of traditional classroom training.

Review of Existing Materials

None of the existing materials surveyed can be effectively utilized for purposes of this project. Existing material from the military have the broadest possible approach that remotely exists for inclusion to this project, therefore, the review of existing material yielded has little or no impact on the outcome of this project.

Summary

In this chapter the instructional analysis dedicated to tasks have been identified. These tasks were stated in the form of goals. Instructional objectives were then written with entry behaviors defined. The instructional objectives were then sequenced according to task relationships which eventually lead to the instruction. The learning activity

specification was produced depicting the proper selection, type and size of investment. Formative and summative evaluations were discussed and explained, and a review of the existing materials was addressed.

CHAPTER 4

DEVELOPMENT

Introduction

This chapter will address the design of the learning activity produced while also discussing the development of the learning activity. A learning activity review will be performed and materials for evaluation of the job aid produced.

Learning Activity Design Produced

Consideration of all possible job aids was looked at with a degree of scrutiny toward effectiveness. Job aids with text (Tillman, 1985) appeared to be too busy with a lot of words. This would slow down the shipping clerk and reduce productivity. A checklist, such as an airline pilot's pre-flight check list, may be inappropriate since the instructional task analysis identified only two objectives. Therefore, it was decided a simply worded job aid in the form of a "pocket" aid or "wallet" card would be most effective in assisting the shipping clerks toward the correct selection of investment. A trial test showed that some of the shipping clerks forgot to keep their pocket cards in their wallets as instructed. This leads to delays and confusion and prolonged the training activity. It was decided to temporarily display the same information on the

wallet cards at the bins. These cards were to be located in the appropriate investment bins.

Learning Activity Development

Pocket cards were produced. On each pocket card, all the possible types of investment and their sizes were listed. A complete pocket card is provided (see Appendix 6). Informal instructional was given to the shipping clerks on how to best use the job aids or pocket cards by the designer. It was explained that the bin number indicates the location of the investment and its correct size. This could be cross-referenced over to the investments code number as a final verification.

Learning Activity Review

The instructional designer used several sources at J.F. Jelenko to verify correct spelling of products, correct code numbers and bin locations. The sources include a Product Manager and the Shipping Manager. Jelenko's Advertising Consultant checked for spelling, grammar and punctuation.

Materials for Evaluation Produced

An evaluation form was produced measuring worker performance and accuracy. A table was produced illustrating

training expenses for Jelenko's traditional training activities as compared to the actual job aid approach (see table 6).

TABLE 6

Expenses - Training vs. Job Aid

Items	Cost Training	Cost Job Aid
Materials & Supplies	$100	$ 20
Wages*	$384	$ 48
Trainer	$100	$ 25
Prep. Time Costs	$200	$ 20
Food	$110	$ 12
TOTAL:	$894	$ 125

*$6/hr. X 8 hrs. X 8 Trainees

Summary

This chapter discussed the design of the job aid. The chapter stated what job aid would be most effective and why. At the same time, it explained why other job aids would not be effective for this particular training activity. The development of the job aid was completed and illustrated. This chapter also discussed who would be responsible for editing the job aid for accuracy. Materials for evaluation were also produced.

CHAPTER 5

IMPLEMENTATION

Introduction

This chapter will discuss the materials produced for the implementation of the training activity. Instructional delivery and how it was conducted will be addressed. This chapter will also describe the data collection process needed for the summative evaluation.

Materials Reproduced

Revisions were necessitated because the formative evaluation yielded information that necessitated some changes be made in the instructional job aid delivery. This change caused job aid placards be included in the training activity (see Appendix 7).

Instructional Delivery

Shipping clerks were given pocket cards as described in Chapter 4. Due to unforeseen unreliability in carrying the cards, the information found on the cards was also placed in the areas where the investment was stacked. Information on the 10" X 10" job aid placards duplicated the information on the pocket card. Therefore, if a shipping clerk forgets, or a new clerk is hired, the job aid placards will be readily available for immediate use. All clerks

were given informal instruction by the designer on how to use either the job aid placards or pocket cards.

The clerks, when unsure of which investment is requested or which size of investment is requested, will be able to match the request to that of either the pocket card or job aid placards.

Data Collection

The instructional activity was conducted for three months; July, August, and September. During this time, data was collected regarding returned shipments, errors caught prior to shipping and increased productivity. The collection process included personal achievement charts (see Appendix 8). These charts were used to measure accuracy and productivity. Also included were customer service reports measuring returns of investment for those cases where the reasons for their return was incorrect investment shipped.

Summary

This chapter discussed what revisions were necessary for the training activity to take place. These revisions were gathered from the formative evaluation. The instructional delivery was discussed and explained how the job aid was actually going to work. Collection of information was being compiled as the training activity was being conducted.

CHAPTER 6

EVALUATION

Introduction

This chapter will discuss in detail the formative and summative evaluation process. Topics include one-on-one trials, small group trials, and pilot testing. These topics will be related to this project. The summative evaluation conducted will be discussed.

Formative Evaluation

The formative evaluation is an integral part of the instructional design process. The formative evaluation may include a three phase approach with each phase offering its own unique area of expertise. These include: one-on-one evaluation, small group evaluation, and the field trial (Dick and Carey, 1985; Gagne, 1967). Although all three are frequently used together, it is possible to use them individually when developing training for a small target population. Therefore, for reasons associated with this project, the small group evaluation was used exclusively to obtain data for the formative evaluation.

Rationale

A small group evaluation was chosen because of the limited size of the target population. It is also easier to

determine if learners can use the job aid without instruction from the instructor or constant guidance from the supervisor. The selection of learners for the small group evaluation was representative of the target population. The actual selection of the learners was conducted with volunteers.

Implementation

A small group evaluation was conducted using 25% of the target population (total number of trainees was two). The trainees were asked to use the pocket cards when unsure which investment was being requested via the purchase order. The types of data collected include:

- Comments made by the learners about the effectiveness of the job aid.
- The time required for the learners to complete the purchase order (did the job aid speed up or slow down the selection process).

Outcome

The data collected yielded some interesting results. Both learners forgot or misplaced their pocket cards. New pocket cards were again distributed. The job aid appeared to have no influence on speed, but did have a profound impact on consistency when selecting an investment from

the purchase order.

Results

After the formative evaluation was completed, it was decided to incorporate not only pocket cards as a job aid, but job aid placards as well. If a clerk forgot or misplaced a pocket card, a placard could serve in its place. Placards would carry the same information as a pocket card, but would be located in each respective investment area.

Summative Evaluation

A summative evaluation is often used to identify if instruction is effective. Therefore, in order to determine the value of the instruction, training managers must design, collect and interpret the data. Training managers should analyze the training for coverage of content, statement of objectives and most importantly, the relationship of the outcome to the objectives. Although a summative evaluation can closely resemble the field trial of a formative evaluation, its main purpose is to measure the effectiveness of training.

Evaluations can range from the set-up of complicated goals to generally clear achievable goals. These goals can be broken down into logical levels (Kirpatrick, 1986). These steps can be defined as follows:

Level 1: Reaction. How well did the conferees like the program?

Level 2: Learning. What principles, facts, and techniques were learned? What attitudes were changed?

Level 3: Behavior. What changes in job behavior resulted from the program?

Level 4: Results. What were the tangible results of the program in terms of reduced cost, improved quality, improved quantity, etc.

This project did not involve level 1 and 2. The project did not measure, or was it concerned with, how the trainees liked the training activity. Likewise, the project did not depend fully on the trainees learning as in level 2. However, this project was concerned with a change in behavior and ways to measure this change and the results from it.

A practical change in behavior (level 3) was noticed from the trainees because the trainees had a desire to change. All trainees stated that they wanted to perform the job in the "right way." They also have the know-how of what to do and how to do it. The trainees just needed some assistance in how to go about doing it right a greater percent of the time. The supervisor of the shipping department encouraged the trainees in a positive manner. Whenever possible, he rewarded trainees verbally with his friendly personality and understanding of human nature. Thus, the

climate of the workplace offered reason to improve performance and change behavior. Therefore, all these factors had an impact on the employees reason to change and its subsequent change in the employee's positive performance. There were no other known incentives.

Certain kinds of training activities are relatively easy to evaluate in terms of results (level 4) and this training activity falls within this concept. This project not only measured the dollar amount and unit amount saved from the training activity, but measured the cost effectiveness of the job performance aid to that of traditional training activities.

This project included a summative evaluation which measured the effectiveness of the training activity and the performance of the shipping clerks involved. Using the summative assessment chart, the evaluation was able to determine how many orders were filled, how many items were selected correctly and incorrectly. The summative results (see table 7) were able to measure units sold versus units returned and was conducted with all members of the target population.

The summative results indicated a significant average percentage reduction in the amount of units returned. The drop was by more than two thirds from 3.5% units returned

TABLE 7

Summative Results of Training
From August 1st - October 30th 1987

Pkg. Code	Item	Units Sold	Units Returned	% Returned
144/90's	Highspan	490	4	.8%
144/60's	Highspan	270	2	.74%
144/90's	Complete	565	4	.7%
144/60's	Complete	390	1	.25%
	TOTAL:	1715	11	.6%

to 1% returned. This was not only documented during the training activity, but immediately after training was implemented. No other factors changed during this period, therefore, in the opinion of Jelenko management, a strong correlation can be made that the job aid did have a positive effect upon worker performance (see table 8).

Summary

The chapter discussed the formative and summative evaluation process. Discussed were one-on-one trials, small group and pilot testing as they pertain to the formative evaluation. The summative evaluation was presented and it measured the training activities effectiveness, while at the same time it was able to measure worker performance and improvement.

TABLE 8

Returns and Cost Analysis
September - October 1987

	Average Cost	Units	Losses
Units returned prior to training	$ 70	224	$ 15,680
Units returned after training	$ 70	44	$ 3,080
Savings		180	$ 12,600
Project Annual Savings		720	$ 50,400

Training Cost Analysis

Item	Cost
Job Aid Cost	$ 125
Traditional Cost	$ 894
Total Savings:	$ 669

CHAPTER 7

SUMMARY AND RECOMMENDATION

Introduction

This chapter will provide a final overview of the materials, methods, and procedures used. Their impact will also be discussed. Project conclusions, based upon what has been accomplished, will be addressed. Recommendations are suggested if someone else might want to extend what has already been done. Finally, a concluding statement is provided.

Methods and Procedures Used

Jelenko had a problem shipping the correct type of investment to the customer. Management had requested a complete product training course. This course would include a large amount of dedication toward time and a large amount toward money.

A procedural analysis was conducted that identified an investment shipping problem; it described what was happening, and suggested a probable solution. From this analysis, it was determined that a formal training seminar would not address the problem, but that a more specific response had to be developed. Therefore, a job performance aid was created. A design process was focused on how to best utilize the job aid while performing the assigned tasks. Evaluations were conducted to measure, not only the

performance of the learners, but also of the training activity. Formative and summative evaluations were conducted. This helped design the training activity and then measured results from it. An overall dollar savings can be attributed to the training activity. An annual savings can be realized in the amount of $50,400, while at the same instance, the cost of producing and implementing the job aid cost $125.00 where a traditional lecture format would have cost $894.00.

Conclusions

This project has demonstrated the effective use of a job aid and how a job aid, when used in a creative way, can reduce costs. For people to learn, the learning process does not always have to take place in the classroom. In some cases, training itself may not be the solution of choice for the training director. Learning can and will occur in numerous formats. Trainers must identify what learning intervention will work best for every learning opportunity and use it.

Recommendations

1. A similar project could be conducted that extends this project's outcomes to additional products in the Jelenko consumable product line.

2. Further projects should be conducted where and when appropriate, using job aids in the workplace in other organizations. However, these projects should have greater target populations. This increase in the number of individuals could adequately measure a job aid's impact and its effect on job performance.

Concluding Statement

A valuable contribution would be a comparison of Gagne's nine events of instruction within the process of implementing a job aid. However, review of the literature did not produce a viable contribution to the development of this job aid. Also, the Jelenko experience does not suggest how the events are incorporated with a job aid. The job aid provides work direction, instead of instructing. Therefore, Gagne's events of instruction are not referenced in this project.

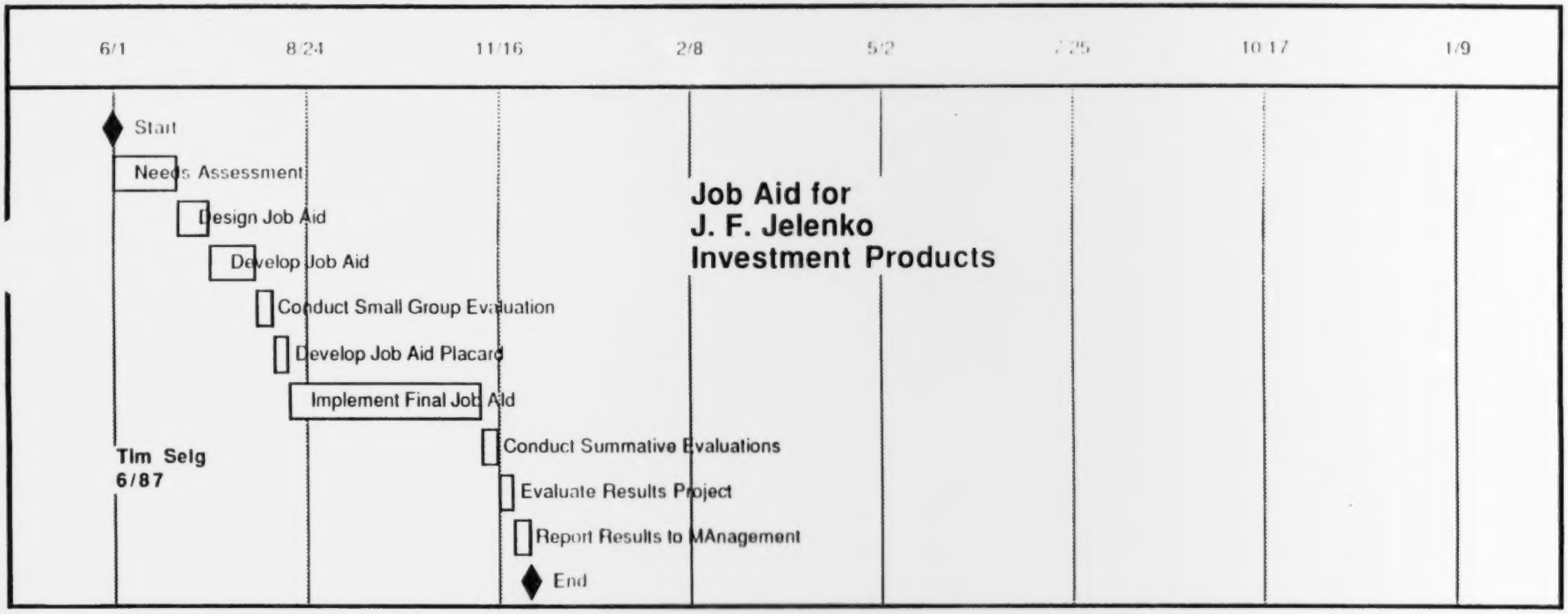
This project has demonstrated that all instruction does not have to take place in the classroom. It further demonstrates that teaching does not always have to be delivered by an instructor to be effective and rewarding. Training managers with imagination and determination can create learning opportunities to assist workers to excel.

Training in the workplace or corporate environment has a lot to contribute to the overall success and profit

of the organization. Successful training outcomes can be obtained when a problem can be fully analyzed and training is really the solution. This project not only demonstrates how a job aid can be just as effective as formal classroom instruction, it also showed that a job aid is less costly to produce. Training can get the job done in the workplace using different methods if only given the opportunity to do so. When the correct training solution is applied, people understand, respond and excel.

APPENDIX 1

Program Plan



APPENDIX 1

Program Plan

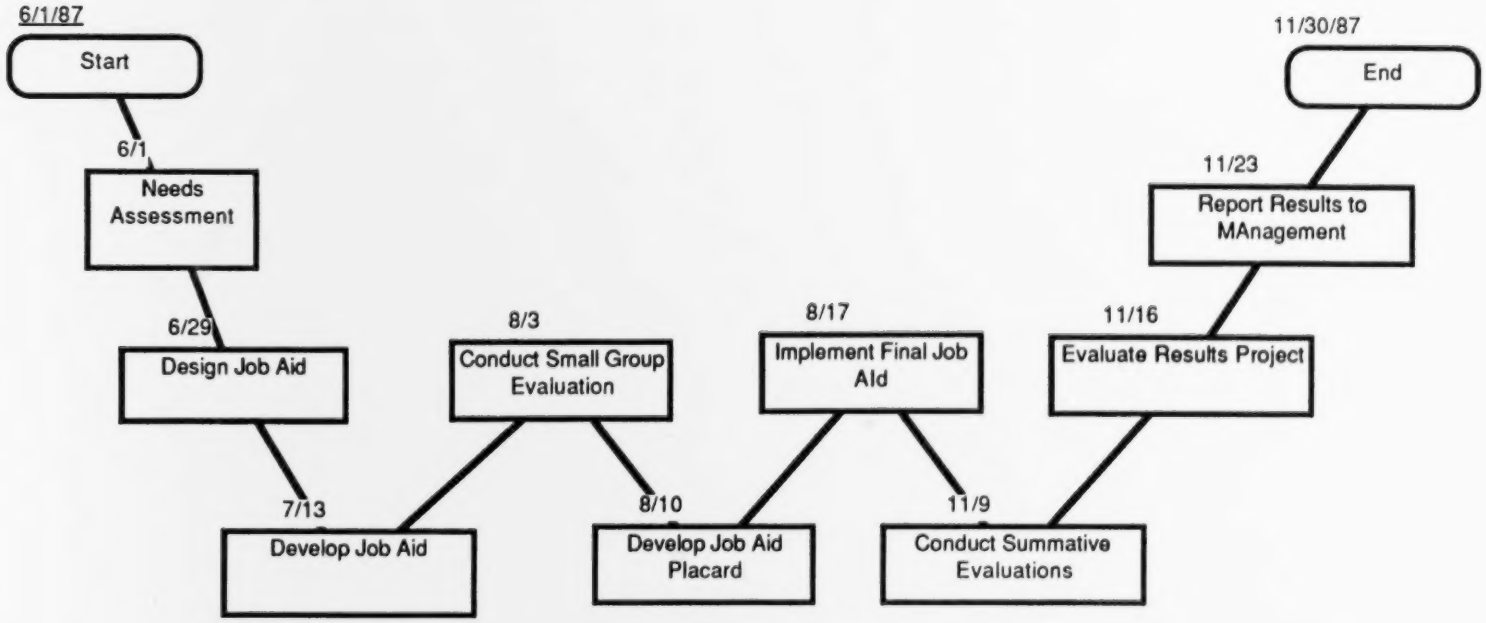
Job Aid for J. F. Jelenko Investment Products

	Task Name	Weeks	Earliest Start	Earliest Finish	Latest Start	Latest Finish	Fixed Cost
1	Start	0	6/1/87	6/1/87	6/1/87	6/1/87	0
2	Needs Assessment	4	6/1/87	6/29/87	6/1/87	6/29/87	0
3	Design Job Aid	2	6/29/87	7/13/87	6/29/87	7/13/87	0
4	Develop Job Aid	3	7/13/87	8/3/87	7/13/87	8/3/87	0
5	Conduct Small Group	1	8/3/87	8/10/87	8/3/87	8/10/87	0
6	Develop Job Aid Placard	1	8/10/87	8/17/87	8/10/87	8/17/87	0
7	Implement Final Job Aid	12	8/17/87	11/9/87	8/17/87	11/9/87	0
8	Conduct Summative	1	11/9/87	11/16/87	11/9/87	11/16/87	0
9	Evaluate Results Project	1	11/16/87	11/23/87	11/16/87	11/23/87	0
10	Report Results to	1	11/23/87	11/30/87	11/23/87	11/30/87	0
11	End	0	11/30/87	11/30/87	11/30/87	11/30/87	0

APPENDIX 1

Program Plan

Job Aid for J. F. Jelenko Investment Products



Tim Selg
6/87

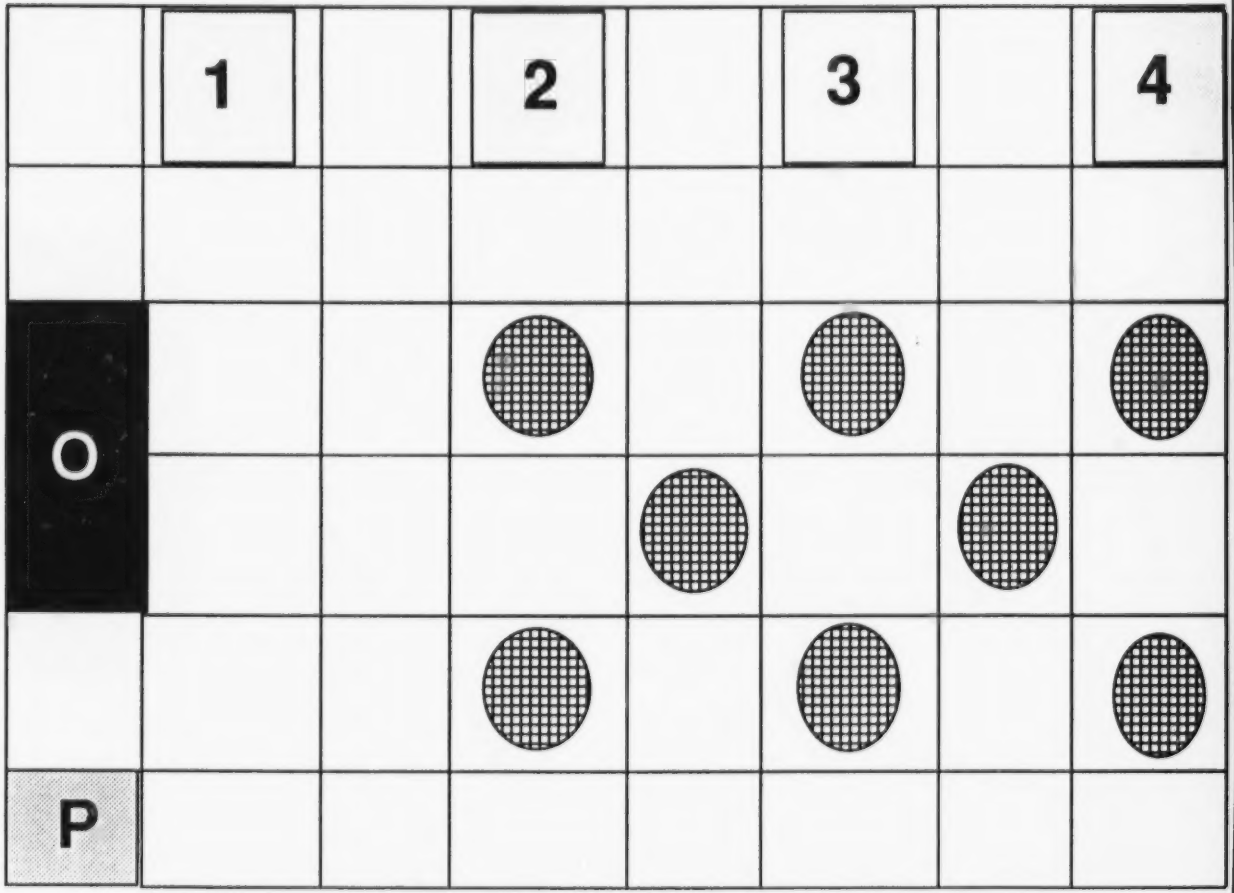
APPENDIX 2

Instructional Task Analysis

- Tear off Purchase Order from printer.
- Read and select proper size, quantity and type of investment ordered by the customer.
- Place the investment onto the loading rack.
- Initial the Purchase Order.
- Move on to the next order.

APPENDIX 3

Shipping Area Diagram



KEY

1. High-Span 144/90
2. High-Span 144/60
3. Complete 144/90
4. Complete 144/60

O. Office
P. Printer
Oval. Work Stations

JELENKO
DENTAL HEALTH PRODUCTS
99 BUSINESS PARK DRIVE/ARMONK, N.Y. 10504 U.S.A

IF NOT DELIVERED IN 15 DAYS RETURN TO SENDER 1ST CLASS POSTAGE GUARANTEED

SOLD TO

JELENKO
DENTAL HEALTH PRODUCTS
99 BUSINESS PARK DRIVE/ARMONK, N.Y. 10504 U.S.A

IF NOT DELIVERED IN 15 DAYS RETURN TO SENDER 1ST CLASS POSTAGE GUARANTEED

SHIP TO

DATE	CUST. NO.	ORDER NUMBER	P.O. NUMBER	LOC.

SHIP VIA

JELENKO
99 BUSINESS PARK DRIVE
ARMONK, N.Y. 10504 U.S.A.

LINE NO.	QUANTITY SHIPPED	QUANTITY B/O	PRODUCT NO.	✓	DESCRIPTION	UNIT		

PACKING SLIP

APPENDIX 5

Line Supervisor Check Sheet

Name of Clerk: _____

Purchase Order Number: _____

Customer Name: _____

Date of Shipment: _____

Type of Investment Ordered (Code #): _____

Type of Investment Selected (Code #)_____

Code Numbers :

Highspan = H --- H-144/90 - W/liq., H-144/60 - W/liq., H-144/90 - W/O, H-144/60 - W/O, H-25 - W/liq., H-25 - W/O.

Complete = C --- C-144/90 - W/liq., C-144/60 - W/liq., C-144/90 - W/O, C-144/60 - W/O, C-24/90 - W/liq., C-24/90 - W/O.

APPENDIX 6

Pocket Cards

Investments W/Liq.	Bin #		Investment W/O Liq.
Highspan 144/90	7	10	Highspan 144/90
Highspan 144/60	8	11	Highspan 144/60
Highspan 25's	9	12	Highspan 25's
Complete 144/90	1	4	Complete 144/90
Complete 144/60	2	5	Complete 144/60
Complete 25's	3	6	Complete 25's

APPENDIX 6
Job Aid Placard

High-Span Investment 144/90's w/out liq.

APPENDIX 8

Summative Assessment Score

Personal Achievement Chart for
Selecting Investments

Employee's Name: _____

Instructions:

Column 1: Enter current date
Column 2: Enter number of orders filled
Column 3: Enter items selected correctly
Column 4: Enter items selected incorrectly

(1) Date	(2) Number Of Orders Filled	(3) Items Selected Correctly	(4) Items Selected Incorrectly
TOTALS:			

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